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THE U. S. COLLIER JUPITER.
BY LELAND WEBER.

NEGLECTED LOAD FACTOR BUILDERS.
BY R. B. MATEER.

THE JOBBER AND THE CONTRACTOR.
BY F. N. AVERILL.

INTERDEPENDENCE.
BY L. M. KENNEDY.

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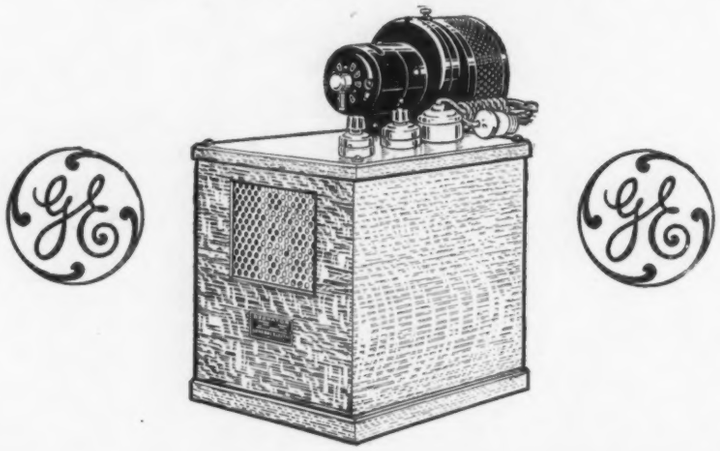

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VOLUME XXXI SAN FRANCISCO, JULY 19, 1913 NUMBER 3

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THE U. S. COLLIER JUPITER

BY LELAND WEBER.

The new naval collier Jupiter with its electric propelling machinery has just been completed at the Mare Island Navy Yard. The boat is 540 ft. in length with a 65 ft. beam. It draws 27 ft. 6 in., has a displacement of 20,000 tons, carries 12,000 tons of cargo and is designed to operate at 14 knots.

The Jupiter is a sister ship to the Neptune and the Cyclops, the latter being equipped with triple expansion engines and the former with Parsons turbines connected to the propellers by mechanical gearing. In the case of the Neptune published reports state that it did not meet the contract requirements. This may be explained as the turbine speed was 1250 r.p.m., which is too slow for efficient turbine design and the propeller speed 135 r.p.m., which is too high for the most efficient propeller operation.

Launching of U. S. Collier Jupiter.

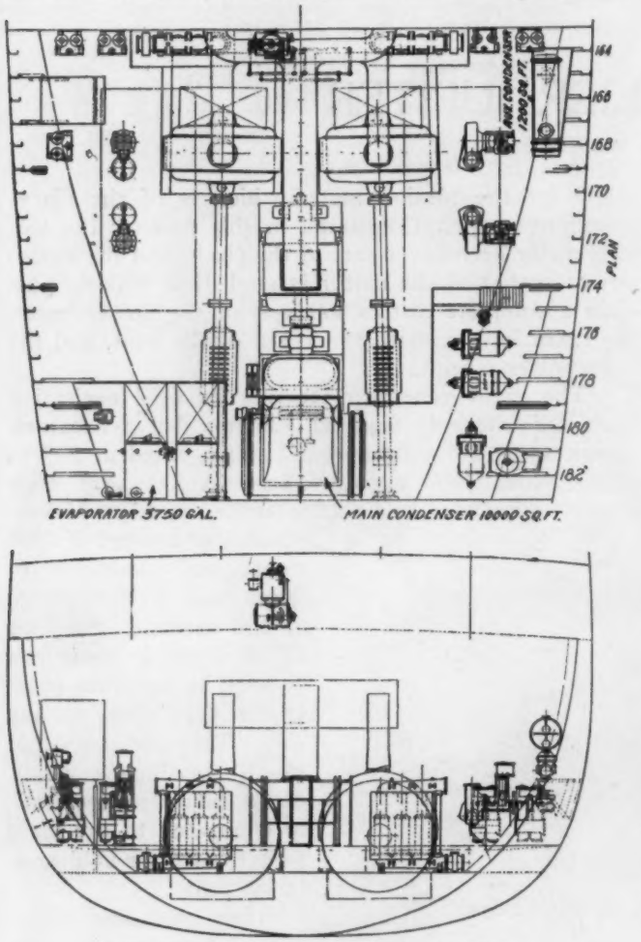
The method of propelling the U. S. collier Jupiter is a new engineering undertaking. The first example of turbo-electric propulsion on any scale is afforded by the city of Chicago fire-boats, Joseph Medill and Graeme Stewart. The main power unit on the Jupiter is a Curtis, 9-stage, horizontal turbine, rated at 5500 h.p. Directly connected to this turbine is a General Electric alternating current, 33-cycle, 2-pole, 5450 kw. generator. The speed of this set at 14 knots is about 2000 r.p.m. The above set is placed between the two propeller shafts and has no mechanical connection to them.

On each side of this set and directly connected to the ends of the shafts are two 36-pole, General Electric induction motors operating at 33 cycles, 2300 volts, 665 amps., and rated at 2750 h.p., making between 107 and 110 r.p.m. at normal speed. The generating unit and motors are self-lubricating and self-ventilating. These motors are electrically connected to the generators through the main switch-board. The propeller shaft is 15½ in. in diameter. Between the driving motor and the thrust-bearing the shaft is hollow to allow for the torsion meter which is of the Gary-Cummings type. Connected in this manner the torsion meter becomes a part of the shaft, and the horsepower output of the motor is read, thus making possible a complete test or analysis of the power input, the r.p.m. of the shaft, the speed of the boat, and the horsepower output.

The main generator receives its field excitation from 3-2 interpole General Electric d.c. generators, operating at 125 volts and 280 amps., rated at 35 kw. and making 3600 r.p.m. These exciters are each directly connected to a Curtis turbine rated at 35 kw., running at a speed of 3600 r.p.m. and designed to take steam at 150 lb. gauge at the throttle. Any or all of these exciters can be used to generate power for the lights on the ship. They are connected to an auxiliary switchboard, which is electrically connected to the main switchboard for field excitation only.

For providing resistance when starting the motor, a set of water cooled rheostats is used. These are operated by a lever at the side of each motor. A hand wheel at the switchboard is connected to the governor levers, which controls eight operating valves. This hand wheel can be set to govern at any speed desired. With this arrangement one man, standing in front of the switchboard, can reach and operate everything for running the boat. On the front of the main switchboard are six switches: four oil switches, two on each side, and a knife switch in the center. The oil switches provide the only electrical connection between the generator and the motors. One of these switches is for going ahead and one for the reverse. If there were only two oil switches it would mean that the motors would have to be connected as a unit; that is, both operate at the same speed in the same direction. The feature of the actual installation with the two oil switches for

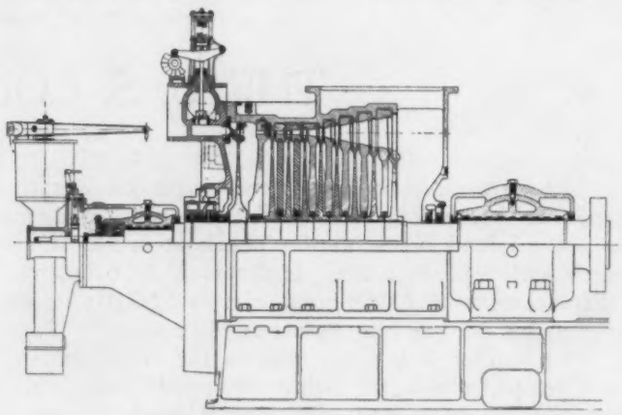
each motor, is that the motors act as separate units and are in no way connected. The fifth switch, or knife switch, is the field excitation switch, through which the power from the auxiliary or exciter switchboard is brought to the field of the main generator. Below this switch is a rheostat which regulates the amount of electricity going into the exciter field. In this way the field strength and output of the generator is governed. The action of this rheostat is not directly in the circuit of the field of the main generator but acts on the field of the exciter, and thus indirectly on the field of the main generator.



Cross Sections of U. S. Collier Jupiter.

The two levers at the sides of the motors are for cutting in or cutting out the water rheostats. There is a complete interlocking system between these levers and the oil switches on the board, so as to make it impossible to injure the motors or the generators As a further safety precaution the oil switches on one side of the board are locked against each other. This construction makes it impossible for the operator to short the leads from the generator in back of the board.

There are two methods of starting the boat. With the turbine standing, the motors may be put into operation by throwing in the ahead switch on the main switchboard, and throwing out the rheostats or resistance on the motors by means of the levers at their sides. Next, with the exciters running and a low field excitation, the turbine is started and brought up to speed, the field being strengthened until it reaches full voltage. In this way the motors will come up to speed directly as the field on the main generator builds up until the entire set is at normal speed. The second method of starting is with the turbine running. This is accomplished by pulling out the exciter field switch which is the center switch on the main board and by putting in the resistance on the motor circuit by means of the levers at the sides of the motors. Then put in the oil switch for going ahead and throw in the field switch. The operator must wait, however, until the field has built up and is at normal voltage, then he must throw out the resistance on the motors which



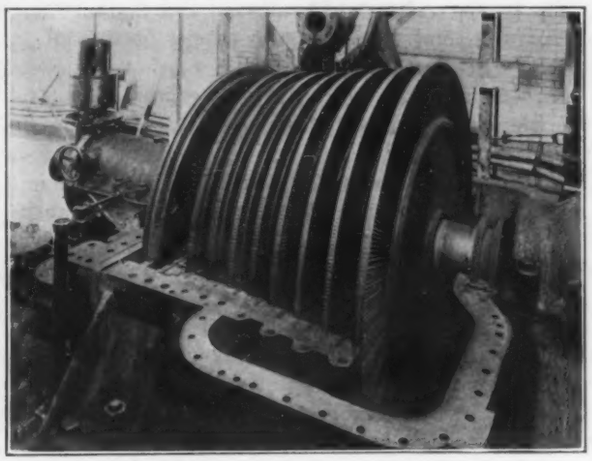
4000 kw. Nine Stage Turbine.

will come up to speed at once. From this it can be seen that it does not make any difference whether the turbine is standing or running in order to start the boat.

For reversing the engines, practically the same operation is gone through as is used when starting with the turbine running. If the boat is running at all speed ahead and the motors have to be stopped and reversed, the ahead switch must be pulled before anything else can be done. If it were possible to throw in the reversing switch with the ahead switch in, there would be a short behind the board; since the function of these switches is to reverse the direction of the current in the motors. If the ahead switch were pulled out and the reversing switch thrown in, it probably would injure the motor, as it would be running at full speed ahead and when the reversing switch is thrown in, it would reverse the full power in the opposite direction. To prevent this, before the reversing switch can be thrown, the field must be broken on the generator and the resistance thrown in on the motor. It is not necessary to wait until the motor comes to rest before throwing in the reversing switch, since when the power is thrown on in the other direction, the motor will stop itself and start in the opposite or reverse direction. When the motor has taken the new direction the resistance can be thrown out and the motor will come up to speed. The time of this reversing action was tested in the General Electric factory and found to be 40 seconds; that is, the time elapsing between full speed ahead to full speed astern is 40 seconds. Whether or not that can be equalled in the actual operation of the boat with the propellers connected to the shaft is a question that can only be answered by an actual test. It is also possible to run one motor in one direction and the other in the opposite direction if such a desire

should occur. The big advantage shown in the last statement is realized in the duty of a collier. With this arrangement, it is far easier to maneuver at sea in order to get alongside of a boat which is to receive coal. It would even be possible to have the boat swing in a complete circle with the stern as a center, if this were necessary, merely by running the propellers in opposite directions. In passing it might be stated that in general the resistance is left in on the motors in starting, reversing or maneuvering and only out when on a free run.

The boilers for supplying the steam to the turbine are 3 double-ended Scotch marine boilers and are the



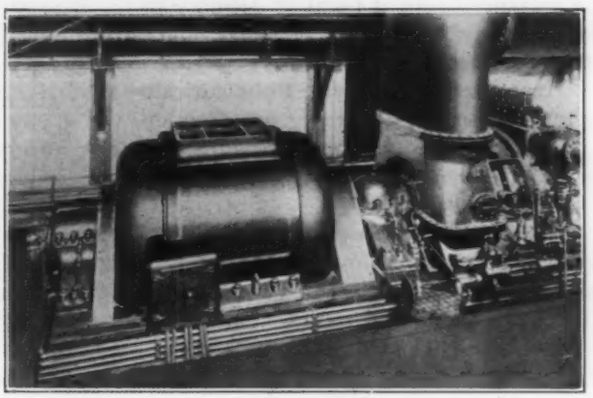
Assembly of 4000 kw. Horizontal High Pressure Nine-Stage Curtis Turbine.

largest in the United States service on the coast. The boilers are 25 ft. in length and 16 ft. 3 in. in diameter, and have a total heating surface of 19,379.07 sq. ft. In addition to the main boiler installations there is one donkey, upright fire tube boiler, 7 ft. 2 in. in diameter, which supplies steam to the hoists and other auxiliary machinery not in the engine room. The maximum boiler pressure is 200 lb., while under normal operation the pressure at the throttle of the turbine and other auxiliary apparatus is 185 lbs.

The two boiler feed pumps are vertical, 2 cylinder, double acting Blake water pumps, size 12 x 8½ x 12 in. These pumps, like all other apparatus for the operation of the ship, with the exception of the boilers, are placed in the main engine room. Only one of these pumps is required under normal operation for boiler feed purposes, the second one being an extra unit, used only in case of injury to the regular pump. In addition to the boiler feed pumps are: 1 sanitary, 1 fire, and 1 ballast pump, which were manufactured by the government at the Mare Island shops. There is also one 2-cylinder, double acting, vertical Blake water pump, size 12 x 8½ x 12 in., used to pump out the bilge water and also used as a circulating water pump for the water cooled rheostats.

The main turbine exhausts into an Alberger condenser which has a total of 6500 tubes and a cooling surface of 10,000 sq. ft. This condenser was built by the government in the shops at Mare Island from the plans furnished by the Alberger Company. The circulating water for the main condenser is furnished by two 4 in. centrifugal pumps driven by two reciprocating engines. These pumps and engines were also built at the Mare Island shops. The dry vacuum pumps are two vertical, double acting Alberger reciprocating pumps, size 10 x 24 x 14 in. The condensate is taken care of by two 3 in. centrifugal turbine driven pumps placed directly below the main condenser. There is also a Wheeler condenser set of 1200 sq. ft. cooling surface, into which the auxiliary machinery exhausts. In this way everything in the engine room operates condensing.

A 3000 gallon evaporating unit consists of a double set composed of two 36 in. Rielly multicoil evaporators and two 14 in. Rielly multicoil condensers. The function of this apparatus is to take the salt water



Turbine as Installed.

from the ocean and by a process of evaporating and condensing render it pure and fresh for drinking purposes.

The tested water rate of the main power unit was found to be 11.2 and 13.7 lbs. of water per hour per brake horsepower for a speed of 14 and 10 knots respectively. The actual weight of the equipment is 156 tons, which is a saving of about 40 per cent over the reciprocating engines designed for the boat. The ratio of synchronous speed reduction between the generators and motors is 18 to 1. The smooth running qualities of the installation, the ease of operation, and the rapidity with which reversing may be effected, indicate that this installation shuodl be an unqualified success.

EXTENSION OF ELECTRICAL PLANTS IN BAVARIA.

The electric industry has continued to extend its operations, and in spite of overtime work all the orders could not be fully executed. The demand for electric power in Bavaria is growing continually, it being used more and more for cooking, heating, and agricultural purposes. The State, however, has hitherto done almost nothing to introduce electric power for railway traction.

The Leitzach Electric Works will furnish 15,000 horsepower, and part of the plant will be put in operation in 1913. The company has a capital of $1,428,000, in which the city of Munich participates with 51 per cent. In addition, it has issued bonds for $952,000.

At Haidhof, to the north of Regensburg, the electric plant which has heretofore supplied 4000 horsepower has been doubled in capacity, and a further enlargement is planned.

ELECTRICAL PUMPING AND IRRIGATION

MEASURING DEVICES.

BY B. A. ETCHEVERRY.

To properly operate an irrigation system measurements are necessary at the following places: (1) on main canals and laterals, (2) at head of all laterals, (3) at point of delivery to irrigator. The measurements on the main canal and main laterals are desirable to know their carrying capacity at any time. The measurements, at the heads of all laterals are necessary to properly divide the water between the laterals. The measurements at point of delivery to the irrigator are necessary whenever water is sold according to volume delivered.

For a measuring device to be entirely satisfactory, it should meet the following requirements:

1st. It should not only measure the water at any one time, but it should keep a continuous record of all water delivered.

2d. In many cases it is desirable that it should maintain a constant flow when once it is set for full capacity or fraction of full capacity.

3d. It should be able to handle any fraction of its full capacity.

4th. It should not require difficult computations to obtain the results of the measurements.

5th. It should not be easily interfered or tampered with.

6th. Where the available grade is small it should require the least possible loss of head.

7th. The cost of the device should not be excessive.

The measuring devices most generally used are:

1. Rating station—Rating flume.
2. Weirs: rectangular or trapezoidal.
3. Miners' inch board or box.
4. Submerged orifices.
5. Other devices: Grant Michell meter—Kennedy Gauge Outlet.
6. Automatic registers.

Rating Station—Rating Flume.

A rating station consists of a selected section on the canal whose discharge is known for any given depth of water. To obtain this relation between the depth of water and discharge it is necessary to rate the station. This is done by taking a number of measurements of canal cross section and corresponding velocities for a wide range of discharges. The velocity is obtained by means of a current meter of measurements of depth and width. The product of the velocity and cross section gives the corresponding discharge. By plotting these results the rating curve of the station is obtained from which a table can be prepared. By consulting this curve or table the discharge for any depth of water can be obtained. In order to have a permanent station it is often preferable to place a rating flume in the canal. The rating flume consists of a short length of flume not less than 12 ft. nor less than twice the average width of the ditch or canal. The width and depth of the flume should be equal to the average width and depth of the canal. The upstream end should be connected to the earth canal by means of wings, aprons and cut off walls as previously described for flumes. Transversally the floor should be perfectly level and longitudinally it should be set to the grade of the ditch. The floor should be placed about 1/10 ft. above the grade of the ditch so that all silt may be carried through and not permitted to settle and destroy the form of the cross section.

The gauge rod should be placed at a distance from the upstream end three-fourths of the length of the flume. Where an automatic register is used the well for the float must be placed at this point on one side of the flume and connected with the water by an orifice through the side 1 in. or more in diameter. Usually a well cross section of 12 by 18 in. is sufficient.

The channel of the ditch in which the rating flume is placed or on which the rating station has been selected should have a uniform cross section and be straight for 100 ft. upstream from the flume with its axis passing through the middle of the flume. The channel downstream should not have obstructions or gates which are liable to back the water up or in any way affect the rating. The advantages of the rating flume are that it can be used for large volumes of water, is not affected by silt and does not require any loss in head or in velocity. The chief disadvantage is that it can not be used with accuracy when there are check gates or obstructions which will back the water up and change the rating.

Weirs.

The weir is the most generally used measuring device found on irrigation systems, for the reason that it is simple to construct and use and will give accurate results when properly installed. The weir is generally

Cippoletti or Trapezoidal Weir.

limited to moderate quantities of water and requires sufficient fall or grade for its installation and for these reasons can not always be used. The term weir is applied to any dam or barrier across the stream and

over which the water flows. The weirs used in irrigation consist of a board or barrier into which a notch is formed through which the water flows. The volume of water passing through the notch is obtained by knowing the length of the notch and measuring the depth of water passing over it. The form of notch is generally either trapezoidal or rectangular and in some cases a triangular or V shaped notch is used.

The trapezoidal weir is known as the Cippoletti weir and is more common than the other forms. It consists of a horizontal crest and the two sides, each sloping outward one inch for every four inches rise. The rectangular weir has vertical sides. The first form has the advantage that the flow may be computed by means of a simpler formula. The second form is a little easier to construct and is more accurate because its formula has been derived from a larger number of experiments. In either case the flow can be obtained by referring to the tables given farther.

The weir may consist of a simple board placed across the ditch or of a board set in a short section of flume or box, in which case it is called a weir box. The weir board may be of wood, metal or concrete. When made of wood or concrete it is desirable to use a metal plate to form the edges of the crest and the sides. When no weir box or flume section is used, the weir board is placed directly across the canal, and sufficiently braced with posts. A weir box or flume box is generally used. The box is a short flume section whose length is not less than 8 to 12 ft. The width and depth must be at least sufficient to give the required dimensions to the weir board. The weir board should be placed at a distance from the upstream end equal to 2/3 the length of the box, the lower third forming a floor for the falling water. The depth measurement should be made at least 4 to 6 ft. upstream from the crest, from a post or scale fixed on the side of the flume with the zero point level with the weir crest. To obtain accurate results the following rules for the dimensions of the notch should be observed.

1. The greatest depth of water which should be allowed on the crest of the weir should not be more than 1/3 the length of the weir and the least depth 1 in. The depth is usually controlled by the fall available. Where the fall available is small a large length and small depth are necessary.

2. The distance from the crest of the weir to the bottom of the canal or floor of the weir box should be at least three times the depth on the weir.

3. The distance from the edges of the weir notch to the sides of the canal or of the weir box should be at least twice the depth on the weir.

4. The upstream side of both the crest and the edges of the weir north should be brought to a knife edge or to a sharp corner; the beveling should be on the downstream side. With a sharp corner and a thickness of crest not greater than ½ the minimum depth of water the discharge will be the same as for a knife edge.

In placing the weir in position the following directions must be followed:

1. The weir when used on a ditch should be placed in a section of the ditch which is straight for at least 50 ft. above the weir and the center line of the ditch should be perpendicular to the weir board and pass through its center. The cross section of the channel should be not smaller than the cross section of the weir box in order to have slow velocity and fairly calm water above the weir. If the weir box must be placed near the takeout gate the velocity must be made uniform by means of baffles.

2. The weir must be set high enough to give to the overflowing sheet a free fall on the downstream side. A common rule is to make the level of the water on the downstream side lower than the crest by not less than ½ the depth of water on the crest. To obtain free fall it is best to select a section of the ditch which has considerable grade.

3. In letting water in a weir box through a pipe it should discharge at the bottom of the box and depth of the box should be sufficient to produce a calm body of water on the upstream side of the weir. In some cases this requires the use of baffle boards to break up the velocity of the approaching water.

4. The crest of the weir should be level from end to end.

5. The measurement of head should show the true elevation of the water surface above the weir crest. Directly at the crest and for a short distance above it the water surface curves down. This requires that the water be measured a certain distance upstream.

When the weir has been installed the only measurement to take is the depth of water or head over the crest of the weir. To make this measurement it is necessary to provide a reference point level with the weir crest, from which the depth is measured. This point must be at least 2 ft. upstream from the weir crest for a small weir, and preferably 4 to 6 ft. For a weir box this reference point may be a nail driven part way in the side of the box at the level of the weir crest, or a bracket or support formed by nailing a strip to the side of the box. For a simple weir board a stake may be driven into the ditch. The depth of water above the reference point can be obtained sufficiently close for ordinary purposes by using a carpenter's rule and reading the depth to the nearest ⅛ in.

Knowing the length of the weir crest and having obtained the depth of water, the discharge in cu. ft. per second or miner's inches may be obtained by using the following formulae or by referring to the following tables.

Formulae for discharge with no velocity of approach:

1. Rectangular weir with end contractions; $Q = 3.33\ (b - .2H)\ H^{3/2}$

2. Rectangular weir without end contractions; $Q = 3.33\ bH^{3/2}$

3. Cippoletti or trapezoidal weir; $Q = 3.367\ bH^{3/2}$

Formulae for discharge with velocity of approach:

1. Rectangular weir with end contractions; $Q = 3.33\ (b - .2H)\ [(H + h)^{3/2} - h^{3/2}]$

2. Rectangular weir without end contractions; $Q = 3.33\ b\ [(H + h)^{3/2} - h^{3/2}]$

Where Q = discharge in cu. ft. per second.
b = length of crest in feet.
H = depth of water over weir crest.
h = velocity head due to velocity of approach.

Table of Discharge for a One Foot Cippoletti Weir.

Depth of water on crest. inches	Discharge. Cu. ft. per second..	Depth of water on crest.	Discharge. Cu. ft. per second.
1	.08	4	.65
1 1/8	.10	4 1/8	.68
1 1/4	.11	4 1/4	.71
1 3/8	.13	4 3/8	.74
1 1/2	.15	4 1/2	.77
1 5/8	.17	4 5/8	.81
1 3/4	.19	4 3/4	.84
1 7/8	.21	4 7/8	.87
2	.23	5	.91
2 1/8	.25	5 1/8	.94
2 1/4	.27	5 1/4	.97
2 3/8	.30	5 3/8	1.01
2 1/2	.32	5 1/2	1.04
2 5/8	.34	5 5/8	1.08
2 3/4	.37	5 3/4	1.12
2 7/8	.40	6	1.19
3	.42	6 1/4	1.26
3 1/8	.45	6 1/2	1.34
3 1/4	.47	6 3/4	1.42
3 3/8	.50	7	1.50
3 1/2	.53	7 1/4	1.58
3 5/8	.56	7 1/2	1.66
3 3/4	.59	7 3/4	1.75
3 7/8	.62	8	1.83

This table is computed for a one foot Cippolletti or trapezoidal weir, but it may be used for longer weirs by multiplying the quantities given by the length of the weir in feet. For instance a two foot weir will give twice the discharge obtained for a one foot weir. An 18 in. weir will give 1½ times the values given in the table. For accuracy a one foot weir should not be used for depths greater than about 4 in. For larger discharges it is preferable to use a longer weir crest.

Table of Discharge for Rectangular Weirs With Full Contraction

Depth of water on crest inches.	Discharge cu. ft. per second for 1 ft. weir.	Discharge cu. ft. per second for 2 ft. weir.	Discharge cu. ft. per second for 3 ft. weir.
1	.079	.159	.239
1 1/8	.094	.189	.285
1 1/4	.110	.222	.33
1 3/8	.126	.255	.38
1 1/2	.144	.29	.44
1 5/8	.161	.32	.49
1 3/4	.180	.36	.55
1 7/8	.20	.40	.61
2	.22	.45	.67
2 1/8	.24	.49	.74
2 1/4	.26	.53	.80
2 3/8	.28	.58	.87
2 1/2	.30	.62	.94
2 5/8	.32	.67	1.01
2 3/4	.35	.72	1.08
2 7/8	.37	.76	1.16
3	.40	.81	1.23
3 1/4	.44	.91	1.39
3 1/2	.49	1.02	1.54
3 3/4	.54	1.13	1.71
4	.60	1.24	1.88
4 1/4	.65	1.36	2.06
4 1/2	.71	1.47	2.24
4 3/4	.76	1.49	2.43
5	.82	1.72	2.61
5 1/4	.86	1.84	2.81
5 1/2	.94	1.97	3.00
5 3/4	1.00	2.11	3.20
6	1.06	2.23	3.41
6 1/4		2.38	3.63
6 1/2		2.51	3.87
6 3/4		2.65	4.06
7		2.80	4.29
7 1/2		3.00	4.47
8		3.40	5.20
8 1/2		3.70	5.65
9		4.00	6.15
9 1/2		4.30	6.64
10		4.64	7.15
10 1/2		5.00	7.71
11		5.32	8.24
11 1/2		5.65	8.78
12		6.00	9.34

The above table is for rectangular weirs with crest 1, 2 and 3 ft. long. It will be noticed that for this type of weir the discharge is not exactly in proportion to the length of the weir crest, especially for the greater depths of water on the crest.

The form of construction of the weir will depend on the conditions where it is used. It may be used on a ditch or a flume in which case it is placed either as a weir board or a weir box across the canal or flume or it may be used to measure the water taken out of a pipe in which case it is placed around the takeout valve. Unless some device is used for automatically keeping the head constant, the amount of water passing over the weir will of course vary with the rise and fall of water in the canal.

The advantages of weirs are that they are accurate and simple to install. The disadvantages are that they require considerable fall and that the canal and portion of the weir box above the crest will silt up rapidly when the water is not clear and this will destroy the accuracy of measurements.

TWENTY-FIRST ANNUAL MEETING OF THE SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION.

The regular annual meeting of the society for the promotion of Engineering Education was held in Minneapolis from June 24th to 26th inclusive. The principal sessions were held in the new engineering building of the University of Minnesota and in the West Hotel, the latter being a joint session with the American Water Works Association. A comprehensive series of papers was presented by members and nonmembers covering many of the important phases of engineering education and allied matters. Several of these took tangible form in committees appointed to carry out the suggestions presented in the papers. For example, a paper by Professor E. V. Huntington of Harvard University on The Units of Force was partly instrumental in causing the appointment of a committee on the Teaching of Mechanics to Engineering Students. In another paper Mr. D. M. Wright, of the Henry & Wright Manufacturing Company, suggested the appointment of a committee to study and report upon the standardization of technical terms. This suggestion was carried out.

The presidential address of Professor Wm. T. Magruder, of the Ohio State University, was devoted to the qualifications required in a good instructor. He pictured an ideal instructor as one who knows his subject but is also in mental reach of his students; who has the highest reputation for honesty, right living, patience and sound character; who is in practical touch with the subjects he has to teach and who has unbounded enthusiasm for the work of both teacher and engineer.

Other important papers treated of the construction of buildings for technical schools, instruction in highway and in hydraulic engineering, in shop-work and in drawing. The general subject of academic efficiency was discussed by Professor H. S. Person, Director of the Amos Tuck School of Tufts College. President A. C. Humphreys of the Stevens Institute of Technology and Professor G. F. Swain of Harvard, championed the 4-year as against the course requiring five years or longer, while the opposition was led by Professor F. H. Constant of the University of Minnesota. The results of the operation of the systematic grading system in use at the University of Missouri was described by Professor A. L. Hyde. Professor F. P. McKibben, of Lehigh University called attention to the advantages of summer work for engineering stu-

dents and explained how his students arrange for such work. A very interesting session was devoted to engineering college shop practice and engineering drawing. Professor J. V. Martenis and Mr. W. H. Richards described how shop work is made attractive and stimulating to the students by making the exercises lead to something definite. An extensive exhibit was used to illustrate the working out of the plan. Professor T. E. French of the Ohio State University, a most successful teacher of engineering drawing, showed how this subject can be taught effectively. Among other papers one by Professors C. E. Sherman and R. K. Schlafly of the Ohio State University, described a novel practice of sending civil engineering students into commercial work during the summer under the direction of instructors if the students could not obtain regular summer employment. Professor H. Wade Hibbard of the University of Missouri, presented directions for thesis work and gave a long list of subjects suitable for investigation. Mr. Ivy L. Lee, executive assistant, the Pennsylvania Railroad Company, gave some excellent suggestions from the employers of technical graduates to the teachers, indicating how the latter can exert helpful influence in the right direction, These suggestions were well received and provoked considerable discussion. In addition to the papers there were committee and officers' reports, all of which showed the society to be in good condition and alive to its opportunities.

A number of social functions and excursions increased the pleasures of the meeting and enabled the members to meet the faculty of the University of Minnesota and their families and to appreciate the remarkable beauty of the country around Minneapolis.

The following members were elected to serve for one or more years in the positions indicated: President, C. C. Anthony, Tufts College, Mass.; vice-presidents, H. S. Jacoby, Ithaca, N. Y., and D. C. Humphreys, Lexington, Va.; secretary, H. H. Norris, Ithaca, N. Y.; treasurer, W. O. Wiley, New York, N. Y.; councillors, N. W. Tyler, Boston, Mass.; J. F. Hayford, Evanston, Ill.; A. S. Langsdorf, St. Louis, Mo.; S. H. Woodward, Iowa City, Iowa; M. S. Ketchum, Boulder, Colo.; F. P. Spalding, Columbia, Mo., and P. F. Walker, Lawrence, Kansas.

THE LONGEST TELEPHONE CABLE.

A 35 mile cable for telephone connection between Vancouver and Vancouver Island has been received from England. It cost over $100,000, weighs 560,000 pounds, and the expense in laying was $20,000. Considerable customs duty was saved by the Canadian government not charging duty on that part of the cable laid below low-water mark. It is said to be the longest telephone cable in the world, and is laid at a depth heretofore not attempted, much of the line going 200 fathoms deep in the Gulf of Georgia, at one place being 1356 feet deep. By mid-July a cable will be stretched across Saanich Inlet, which will bring Victoria into much better connection with Vancouver by means of the cable just laid.

INTERDEPENDENCE.

BY S. M. KENNEDY.[1]

The total investment in the electric business represented by the member companies of the National Electric Light Association amounts to two and one-half billion dollars, and the total annual income equals four hundred million dollars. It will be noted that the electric income in the United States has now reached the sum of approximately four dollars per capita. Now it is very evident that this great industry has not made such rapid strides, and attained such giant proportions, as the result of the efforts of any individual, or group of individuals, any company, or combination of companies, or any association or aggregation of associations. No master mind has pointed the way to the goal now reached, and no wing of the industry can truthfully say, "We did it."

Every country in the world, and every man in each country loves the word "independence" for what it means, namely, national and personal freedom. Modern life and conditions, however, have demonstrated that for obtaining the best results and the greatest achievements for the energy expended the word "interdependence" means more than independence.

In the electric business, the network of interdependence is a revelation in itself. We have the inventor, the promoter, the capitalist, the banker, the central station, the manufacturer, the engineer, the jobber, the contractor, the dealer and all the subclassifications represented in each division. And then we have the consumers.

Who is brave enough to say which branch of the industry is the most important? Who dares say that his division would flourish regardless of the others? The inventor depends upon the promoter and the manufacturer. The manufacturer depends upon the engineer and designer to produce his wares, and upon the jobber, contractor and dealer to dispose of them. Then comes the central station to distribute electric energy throughout the land and create a demand for the brains of the inventor and the products of the manufacturer, and interest and educate the public to become consumers of all.

But how far could we go without the capitalist and the banker? Vast sums of money are needed in all branches of the industry. The capitalist is willing to invest provided he feels safe. Who is going to assure him of the safety of the stocks, bonds and debentures he is asked to purchase? The banker! Some might say that after all, the banker is the one who really holds the key to the situation—that he at least is independent. Not so, however, for while he has money to loan and invest he is dependent upon his depositing customers on the one hand, and upon his borrowing customers on the other. The observer must recognize that the wonders accomplished, the achievements recorded and the projects planned are less the results of operation than of co-operation and more to the credit of Interdependence than of Independence.

[1]General Agent Southern California Edison Co., Los Angeles, Cal.

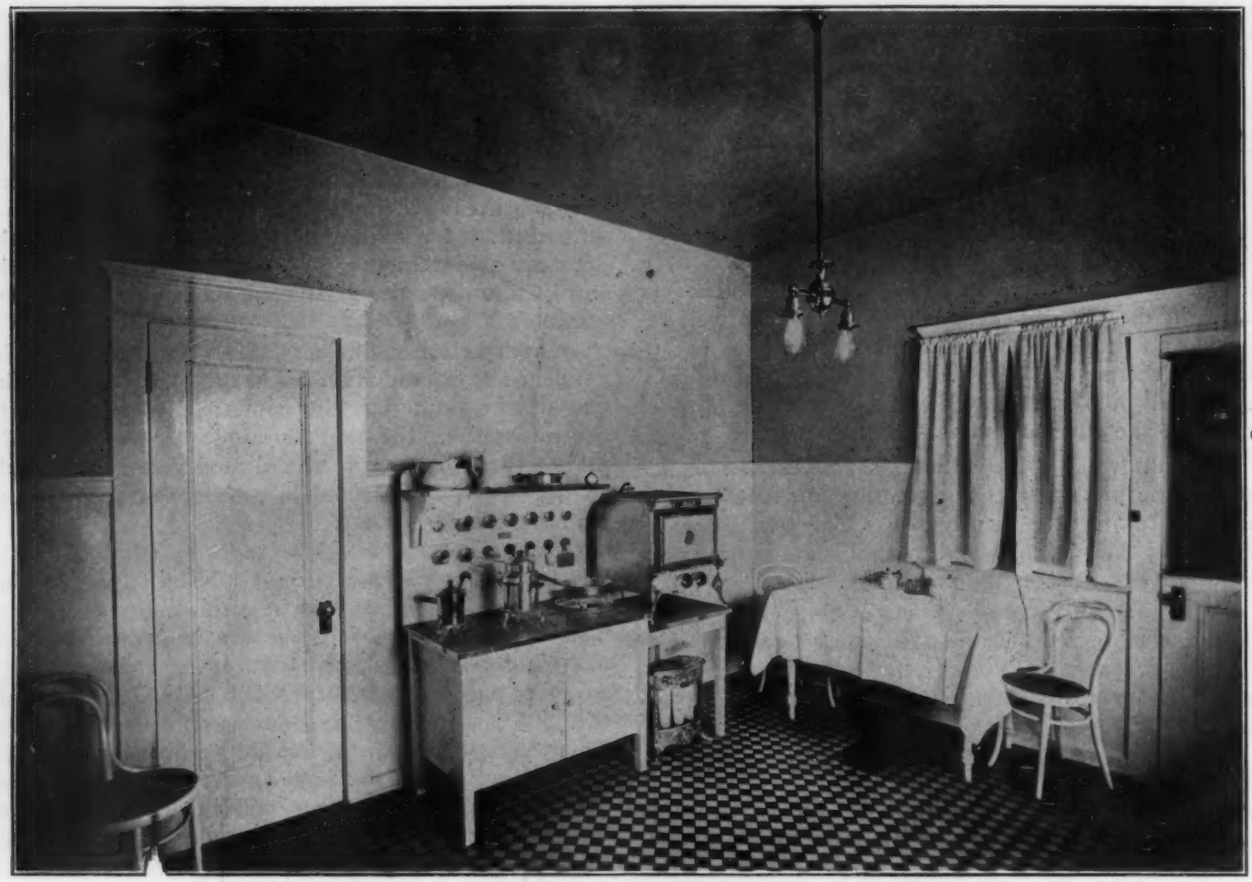
READINESS TO SERVE METHODS

NEGLECTED LOAD FACTOR BUILDERS.

BY R. B. MATEER.

You, Mr. Manager, want to build up your load factor. You desire to increase the output without adding to your fixed charges! Why, then, retain the old fashioned idea that the only market for current arises from the development of lighting and industrial power business?

Only a few years ago electric irons were reluctantly permitted on the distribution systems of quasi public utilities. Now as a result of active solicitation on the part of some up-to-date managers, over three hundred and eighty thousand are in use, yielding revenue to Pacific Coast utilities equal to $190,000 per month, or $2,280,000 per annum, without increase in transformer investment or distribution system.



Typical Electric Kitchen.

It was the convenience and economy of operation that caused the iron to meet with popular favor. The same can be said of other equally efficient apparatus, the toaster, the percolator, the grill, the sewing machine motor, the heating pad and vacuum cleaner; at one time regarded as luxuries, but now necessities in every modern home.

Why, then, Mr. Manager, discourage the electric range by speaking disparagingly of the apparatus, and by placing a high minimum tariff on the use of cooking equipment? You know the old fireplace gave way to the coal range, which in turn was succeeded by the oil burner and gas stove; why not investigate the electric range; the sanitary cooker; ascertain its merits, not by hearsay, but by actual experience. Be prepared for modern methods of cooking. Join hands with the manufacturer in establishing a price on the range, such as will place the appliance within reach of the public. Build your business for the future, not merely for today. What you boost today is obsolete tomorrow. So may the gas stove be compared to the electric range. You seek means of increasing the consumption of current for residence consumer. The puzzle is easy of solution; boost the electric range for residence cooking.

Consumption—Revenue.

The average residence consumer guarantees to use current equal to twelve dollars per annum, while actual analysis of some hundreds of accounts show an average yearly revenue per consumer of eighteen dollars or one dollar and fifty cents ($1.50) per month, on business of a load factor superior to that of purely commercial business, store or office lighting.

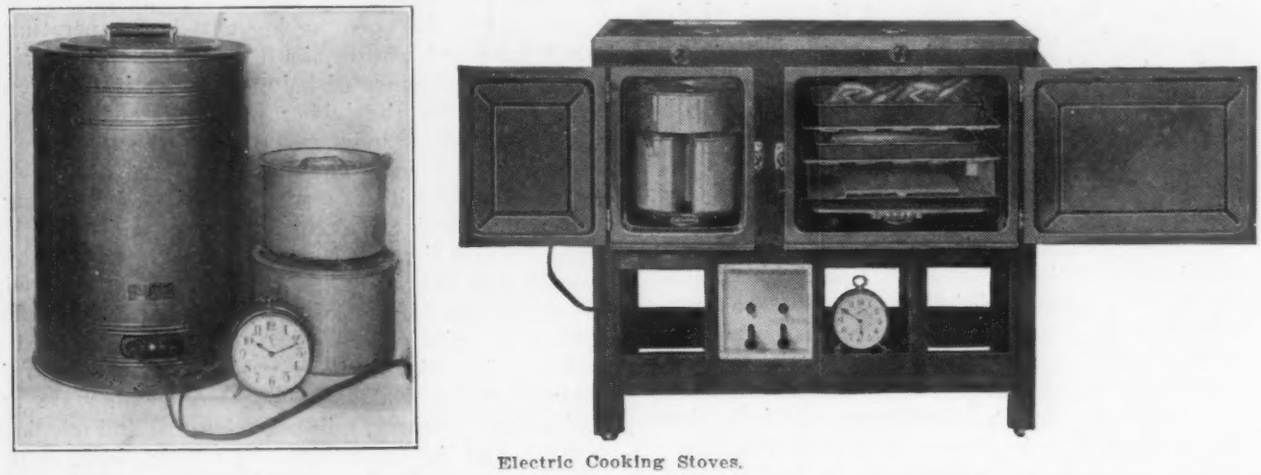
Why not increase the revenue to five dollars per month or more, varying according to the family and its size.

From a comparison of operating costs of electric ranges, in service in California and other states, it is

evident that the consumption of current per day per person ranges from 900 watts to 1500 watts, varying upon the character of food prepared and the average family. Considering, if you please, a family of three. It is possible on the maximum rate of 1½ kw. per day per person to increase the consumption of a residence service 135 kilowatt hours per month, assuring an increase in earnings of $4.05 without additional capacity or increase in secondary feeders, where foresight was used in the original construction.

Consider how many residence consumers you supply, and assuming 33 1/3 per cent good prospects for electric ranges, determine your increase in earnings. It is velvet.

Again, if you please, the average range with a connected demand of 6.8 h.p. occasions a maximum demand of 2 kw. or approximately 3 h. p. which by reason of diversity factor in time of use, as the number of appliances increase, may be reduced to 1½ h.p., at no time in excess of the maximum demand of the average lighting consumer, eliminating one objection to the use of cooking appliances; viz. transformer capacity.



Electric Cooking Stoves.

Fear not the coincidence of lighting and cooking peak. It is a spectre easily dissipated by a brief period of thought. Lighting peaks, bug-bears of a few years ago, have ceased to perplex well managed utilities, that have a well developed industrial load and who are now anxious to better conditions in residential sections. Cooking and lighting maximum demand periods or peaks, will in no case of residence use overlap. Install a meter and try it out. Bearing in mind the consumption per day per person, and the velvet, possible at this time from residence customers, using electric ranges. Let us briefly consider a few of the objections of the range as voiced by representatives of some combination gas and electric companies, obstacles hindering the rapid growth and sales in such appliances and how overcome.

Apparent Obstacles Hindering Sales.

1. Electric cooking demands increased investment in transformer capacity.

2. The range requires that we reinforce our secondaries.

3. Were all to change to electricity we would not have sufficient generating capacity.

4. Cooking load and power load synchronous.

5. Tendency to displace gas and other fuels.

6. Possibility of unbalanced circuits.

7. Contractors and dealers push appliances. Utilities have no jurisdiction over type of appliance. Low efficiency of installed apparatus.

8. Small revenue in proportion to demand.

9. We are operating today not for the future.

Some of the reasons as given for the apparent indifferences to the electric range, such as maximum demand coincidence of peaks and revenue require no other discussion than previously mentioned. Others may be readily disposed of by stating that it is unnecessary to fear all the users of gas fuel in any city are to change at one time to the electric range. Such a development will be gradual and the additional thirty-five thousand kilowatt necessary to supply a community such as Oakland with fuel for electric cooking is available when occasion demands merely by installing additional capacity, utilizing nature's fuel, "white coal."

Why neglect the electric range, leaving its use to be the result of a demand for service, obtained in some cases only after efforts as strenuous as a court order. Why not co-operate with dealer and contractor, encouraging wiring sufficiently heavy to utilize ranges and cooking utensils. Why place a high protective tariff ($1.00 per month per 750 watts connected upon the electric range) discriminating in favor of gas, and other fuels.

Do you, Mr. Manager, operate only for today or are you planning for the future? Do you wish velvet —increased residence consumption at a minimum of expense. In the majority of cases only that investment necessary for the purchase of an additional meter, and covered by a minimum guarantee of one dollar per month, irrespective of the connected cooking load, which you know will not exceed 5 to 7 h.p. It can be secured by active solicitation, co-operation with manufacturer and dealer and by granting a minimum monthly charge that is reasonable one dollar per month. Such a charge introduced in a city of ten thousand inhabitants combined with a meter rate of 3 cents per kilowatt hour increased the revenues from each of the three hundred homes by a sum equal to three dollars and sixty cents per month. Why not your company?

THE JOBBER AND THE CONTRACTOR.

BY F. N. AVERILL.

[This article is a clear-cut exposition of the relations existing between the electrical jobber and the electrical contractor on the Pacific Coast. It represents the essence of a paper read by the author at this year's convention of the Oregon Electrical Contractors' Association. As a brief for the jobber it is excellent. Further contributions on this subject are invited.—Ed.]

It is generally granted that the jobber is the economic outlet for the manufacturer in marketing his products, as he acts in every trade center either as a distributing agent or a direct representative of not only one manufacturer, but of many. As a result the jobber can market their goods from one place of business with one sales organization at considerable less expense than the various manufacturers if they tried to market direct, or if several of them should combine and work under one management. Further than this, the manufacturer has his accounts receivable in a comparatively few number of book accounts, and these few accounts are practically all safe ones. This explanation is one big reason why practically all manufacturers recognize and protect the jobber.

From the contractor's standpoint, one reason for the existence of the jobber is that the jobber gathers from the four corners of the country into one place of business the various lines of supply items used by the contractor in his work, and thus enables the contractor to secure from one source of supply practically everything he needs for the carrying on of his business. This stock enables the contractor many times to economize in his work, as he can go to the jobber and see a new line better adapted for a certain piece of work. Besides, the jobber can often suggest a certain line of material for a certain piece of work, due to his broader experience with the different lines on the market, where, if the contractor had to depend on purchasing from the manufacturer, he would not have the chance of changing his requirements. Very often a local jobber can and should be willing, to post the contractor on any line of new stuff that is coming on the market. He stands between the contractor and the manufacturer as to the quality of the goods, guarantees to the contractor that such items as he selects for a certain piece of work will be approved by his inspectors, or in case the article furnished is not suitable for the purpose and the inspectors turn it down, the local jobber is always ready to stand back of the contractor and see that he gets the right article for the work. In some instances, especially for slow moving merchandise, the contractor pays the jobber more money than he would if he shipped the requirements direct, but in the majority of instances he pays the jobber considerably less money than if he picked up his hundred and one requirements from as many different sources of supply. In the aggregate the costs are less.

On top of this, the jobber stands ready to assist in enlarging the contractor's line of credit in case of delayed contracts. This feature of the business is greatly abused by both sides; that is, the jobber and the contractor are both to blame. The jobber is to blame in that he is not strict enough because fearful of losing business.

The jobber has recognized the fact that the manufacturer needed him as an outlet for his product, has also recognized the fact that the contractor needed him, and as a result we not only have one or two jobbers in every trade center for this purpose; but in some cases we have nearly as many jobbers as there are contractors. As a result of the conditions which brought about the establishment of the jobber, I personally believe he is not entitled to, nor can he afford to take away the legitimate earnings of the contractor and dealer by entering into any lines of electrical business other than a purely jobbing or wholesale business and that these conditions do not make it right that he compete, directly or indirectly, with the contractor and dealer, either in the contracting or retail business. I have more respect for the jobber who comes out in the open, saying that he is operating a retail store and who retails his goods at retail prices and makes no bones of being a competitor of yours than I have for the jobber who sidesteps the retail issue, but who is, under cover, selling his goods retail at wholesale prices. The day has passed not so very long ago when jobbers made a practice of operating a contracting business along with their legitimate line and I feel that the time is passing when a jobber should operate any branch of his business to compete with the customers who make his existence possible. The opinion is quite agreed that the jobber is entitled to look for his outlet to the contractor and dealer, to the central station, isolated plant, municipal, state and national government, railroad, telegraph and telephone systems and the large industrial corporations, as it is quite apparent to anyone in the business that the demands of these buyers are such that no one other than a jobber can handle them in a successful manner as to service.

In carrying out my ideas of a jobber, he could as well be located in a warehouse or suburban location as in the heart of the city, as he would have nothing whatever to show the public, no show window displays, retail department or loafing rooms. At this time it would take a firm of strong courage and a well filled purse to put into effect all the ideas which I believe constitute a true jobber, unless all jobbers would get a change of mind at the same time.

As to the contractor and dealer, I believe the time is fast coming when the retail business will be taken care of by an electrical dealer operating a neat, well appointed store on some principal retail street, in which he makes suitable displays and demonstrations of the various lines of electrical supply items and such electrical apparatus as appeals to the shopping trade. He will do practically no contracting, but will confine himself strictly to the retailing of such items as he carries and will do only such installation work as forms a part of his sales, together with a small repair department for minor work that would come to him. He will leave the competitive bidding, the new work and the troubles of the general contracting business strictly to the electrical contractor, who will conduct his business from an office building, with perhaps a storeroom at some point where he obtains

cheap rent. Thus will come about the segregation of this business—first, the manufacturer; second, the jobber; third, the contractor, and, fourth, the dealer and retailer.

As it is today the words contractor and dealer mean practically the same thing. The majority of contractors are dealers, to a certain extent, and, so far as I know, all dealers are contractors. So in speaking of the relationship between the jobber and contractor I include the dealer in the same class with the contractor.

The dealer of today and the dealer that we will have with us tomorrow, of necessity, have to carry a certain assortment of stock, and on staple items will always buy in quantities sufficient to get them the best price obtainable from the jobber. With them this is quite necessary, as competition at the present stage of the game, not only with themselves, but with many of the jobbers, is very keen, and as they have a very much higher overhead expense to stand than the true contractor who operates from an office. To play a safe game, the true contractor should confine his purchases to exactly what he needs for certain jobs, excepting, of course, that it is policy to combine the purchases for a job ready today with the requirements of a job which you actually have ready for tomorrow. In buying your requirements for actual work on hand you many times will pay more for your purchases than will the dealer who buys in large quantities, and you may think that this condition gives this dealer who is at present doing contracting work an advantage over you, but such is not the case, as the dealer has additional overhead charges to meet which more than offset the difference in quantity price, and, furthermore, when he takes an inventory, he has a large portion of his assets tied up in merchandise, while the true contractor has his assets in accounts receivable or uncompleted contracts. I believe that the time is fast approaching when this segregation of the dealer and contractor will be recognized by the majority as the most economic manner of conducting this business.

The one great trouble with the contractor, next to the lack of capital in starting his business, has been this tying up of money (either his or his creditors) in stocks of goods which, on account of changes in the code or changes in demand, have become practically worthless, and, as a result, the contractor has been carrying them along on his books as an asset, fooling himself and fooling his creditors. Accounts receivable certainly shrink fast enough in case of liquidation, but stock on the shelves shrinks many times faster.

When the time comes that such retail stores as I have mentioned are established, then the time is ripe for the jobber to withdraw into the wholesale district or suburban district and get out of the location of high rents, which at this time is one of his principal bugbears. Under such conditions I cannot conceive of any valid reason why both the contractor and the dealer should not give their entire support to their local jobber, as he would become virtually their warehouse and would perform a service for them, and does today, for that matter, that is certainly commensurate with the returns which he gets. A better support by the contractor and dealer to the jobber in his own center enables that jobber to get together a better stock and thus becomes of more value to the contractor or dealer. A lack of this support in the past has been the cause of considerable friction and has resulted in some jobbers being competitors of contractors and dealers and has caused some dealers to compete with the jobber. This competition by the dealer with the jobber has been made possible by cheaper lines of electrical merchandise and supplies which have been on the market, but primarily by the fact that the dealer would buy in maximum quantities and then job out goods so purchased in small quantities at prices less than the jobber saw fit to handle them. To my notion, the dealer who does this is making a mistake, as the jobber who maintains his prices based on quantities delivered at one time gives the best possible protection under present conditions to the retailer.

If the time comes when all jobbers can be wholesalers in the true sense of the word and not be tempted by the retail business, it will then be possible for them to market the goods which they carry to you at two prices only, that is, an unbroken standard package and a broken package. If such a schedule were put in today by all the jobbers located in the business sections of their various cities it would mean that the retailer would be out of business and the jobber would lose money, as his expenses would then be the equivalent of the retail business.

It may possibly be that I am entirely wrong as to what is forthcoming in the jobbing, contracting and dealer's business, as there seems to be a very strong movement on foot today to absolutely dominate the electrical business from its point of manufacture until it passes into the customer's hands. The only link that is lacking in this chain is the contractor's link, as this chain now has in its make-up the manufacturer, the jobber and dealer and the central station.

Coming back to the relations between jobbers and contractors, I believe that their business relations should be mutually enjoyable, that there should be a personality in the relationship, that there is more to the business than buying and selling, and that the jobber and contractor should strive to gain mutual confidence one in the other. Be broad enough minded to not feel hurt when your jobber asks you for money. This request is not intended as a personal insult, but; like you, he needs money to run his business and there is nowhere else that he can look for it except from whom it is due.

EXAMINATION FOR ELECTRICAL MACHINIST.

The United States Civil Service Commission announces an examination for electrical machinist in the $1000 per annum. Competitors will not be required to appear at any place for examination, but will be rated on their physical condition, training, experience and fitness. Applicants for this position should be practical machinists with three years or more experience, and particularly experienced in the repair of telephones, telegraph instruments, telephone and telegraph switchboards, radio apparatus, and other small electrical instruments..

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Ship Propulsion by Electricity

"Fulton's Folly" derisively characterized the first attempt to propel boats by steam a century ago. To how complete a triumph did this folly-derided adventure ultimately attain, the progress and evolution of maritime affairs since its introduction forcefully bears record. Yet it would seem that once again another subtle force will be called upon to still further develop the niceties of propulsion aboard ship, especially in the navy.

To the layman who has acquired the habit of reasoning in efficiencies, the proposition to introduce still another element in the final product to attain the overall efficiency seems almost an anomaly. Then, it is asked why should the generation of electricity from the turbine shaft and then its reconverting into mechanical energy help matters.

Our leading article of this issue is devoted to a description of the mammoth collier Jupiter, recently completed at the Mare Island Navy Yard. The project is unique in that while certain fire boats for the city of Chicago are electrically propelled, yet this is the first example of turbo-electric propulsion on a large scale. A nine stage horizontal turbine, rated at 5500 h.p., with an actual weight of equipment of only 156 tons, is indeed a saving not to be idly overlooked.

Experiments upon turbine propelled boats non-electrically driven have in the past indicated strongly the shortcomings in their use to be largely due to their inability for pliable and easy reversal. Here again is the evident superiority of the electrically driven device. Not only may the propellers be oppositely driven, thus causing the ship to rotate with its stern as a pivot, but indeed the entire motor operation has been reversed in direction within 40 seconds when under test. Thus it is seen that reversing and maneuvering will be at a high stage of evolution upon the electrically driven sea-dog.

To Western engineers this first piece of electrically driven ship design is significant. In the first place the building of this ship in a Western port indicates strongly the general confidence the government authorities hold for Western workmanship. Again should electric propulsion prove under test in a relative unfavorable instance of this kind its unquestioned superiority, its overwhelming advantages in case of large battleships will indeed be easy of demonstration. Thus once again will the West, its enterprise and workmanship assert itself in affairs electrical.

Power and Irrigation Bureau

The application of electric power to irrigation pumping is one of the most beneficient uses to which this wonderful agent has been applied. Electricity—the mystery of the past, the marvel of the present, and the monarch of the future—has done and will do much to increase man's material comfort and prosperity, and perhaps its highest duty is that of making the desert places of this earth blossom as the rose. As soon as its convenience and reliability are fully appreciated, this ideal form of power will be universally substituted for other forms of manual and animal labor. Incidentally, this promises to

do much toward solving the problem of the high cost of living, which is based largely upon the increased cost of farm products.

But even the simplicity of electric motor operation has not been sufficiently explained to many farmers. Sometimes the power company's interest in the farmer's welfare seems to cease as soon as his load has been connected to their lines. In view of the interest that the average company is now taking in the problems of its lighting and industrial consumers, it seems no more than fitting that the same interest be taken in the agriculturist. It is a mooted question whether the service department of the electric power company should go to the expense of maintaining such supervision or whether the farmer should seek the advice of an independent agricultural engineer. Both methods are being tried. Time has been too short to determine which is the better. But a happy medium has been suggested in the establishment of a central co-operative bureau by a number of power companies to investigate and advise a large number of customers.

Particularly worthy of examination by such a bureau is the question of variation in ground water level and the subsequent changes necessary in pump equipment. While we can not but feel optimistic as to the permanency of the underground water supply, an optimism based upon engineering records for a period of years would be far more effective in convincing the "doubting Thomases." Millions of dollars have been invested in this industry throughout the West, California alone having eighteen thousand motor-driven pumps.

The proposed bureau would be an economical and efficient means of collecting and correlating information upon the amount of water pumped and the seasonal variation in water level, and it would seem to be to the best interest of the power companies to lend their support to such a movement and determine a standard depth for each district. It is to their direct benefit to educate and assist the farmer in getting the greatest water duty for the least cost of pumping plant and for the lowest power consumption. Furthermore, this would maintain the good will which they have already created among their rural consumers. A central bureau, as compared to individual company effort, would not only cost less, but would also give each member company the advantage of the experience of others in similar fields.

One of the prime reasons why many central stations have not taken on more of this desirable class of business is because of the expense of the necessary extensions and the difficulty in financing them until they become self-supporting. Yet a slight exercise of ingenuity and diplomacy would do much to accomplish the desired result. The advent of the automobile has made the adequate lighting of country roads almost as necessary as that of city streets. By arousing public sentiment on this matter, public money can be raised to supply proper lighting systems and thus electric power can also be carried to bordering farms at slight additional cost. Rural business is well worth the effort.

Business Alternations

Business, like an alternating current, changes its direction of flow at recurring intervals. Unlike the alternating current there is no strict regularity in the frequency of these intervals, though between them it alternately builds up to positive values and drops down to negative. In vain has human ingenuity tried to devise some sort of a commutator or rectifier to give a direct or undirectional flow to the course of business. In turn, has individualism, co-partnership, corporation and consolidation been tried and found wanting. The labor union also has failed as a successful means of preventing wages from following the ordinary fluctuations of industry. In spite of all endeavors the financial ups-and-downs of the past century look like a caricature of an oscillogram. Periods of prosperity and times of poverty come in well defined cycles, greatly distorted by financial surges and short circuits as well as by a complexity of other forces whose inter-relation is a problem which has not yet met its Steinmetz.

Little argument is needed to prove that general business now has a negative value. Whether this phenomenon be ascribed to the strain in European finances caused by the Balkan war and the prevalent social unrest, or whether it is due to the pending tariff and currency reform, the fact remains that the pressure and current components of business power are out of phase. Finance is lagging so far behind the bumper crops, the great mineral output and the other contributing factors of prosperity, that general business is "wattless" or idle.

Fortunately the electrical industry has suffered less than almost any other line of business. In fact we believe that the figures will show more business done during 1913 than during any year in the past. The profits may be slightly less because of higher interest rates, but the volume will be greater. The earnings of public utility companies, as shown by the semi-annual statements from all over the country, are greater than ever before, and an increasing number of people find that they must have electric light and power and they must ride on the street cars, even though general industry be drooping and it is necessary to economize on food and clothing. Electricity is no longer a luxury, but a necessity. Its vendors are among the favored few who will always do business because the demand for their services is endless.

Even in general business those who have analyzed the sinusoidal curve of industry predict that the lowest point in the present cycle has already been reached, that through legislative enactment and voluntary action, the financial interests are rapidly getting into phase, and that true business power is now being built up and will soon pass into another period of prosperity. This electrical analogy is based upon the indisputable fact that times of financial depression are invariably and almost automatically followed by periods of increased demand and prosperity. In the parlance of the day, "why worry?" The future is so bright that it needs only the spirit of confidence to assist us during a brief interval.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

Geo. J. Henry Jr., consulting hydraulic engineer, has returned to San Francisco from Lake Tahoe.

H. G. Behneman, manufacturers' agent, Seattle, has returned from a four-weeks' trip to the east.

Joe Holbreck, a Sacramento contractor, was a visitor to San Francisco for a day or two during the week.

G. W. Gillespy, stores manager Western Electric Company, Seattle, spent two days in Portland last week.

John Coffee Hays, president of the Mt. Whitney Power Company, has returned to Visalia, Cal., from the East.

J. P. Peck of the Electrical Supply Company, Sacramento, was in San Francisco the latter part of the week.

L. G. Cushing, Pacific Coast representative of the Bryan-Marsh Electric Works of the General Electric Company, is at Chicago.

S. Russell of H. W. Johns-Manville Company, San Francisco, is taking an auto vacation trip through the north of bay counties.

J. H. Kelly, assistant treasurer Western Electric Company, Seattle, was in Oregon over July 4th, visiting several points in the State.

R. A. Griffin, manager pole department Western Electric Company, with headquarters in New York, spent a few days in Seattle recently.

H. B. Squires of H. B. Squires & Company, San Francisco, left the latter part of the week for an extended trip through the Pacific northwest.

A. R. Fuller of Stuart & Fuller, San Francisco, has been appointed western representative fo the S. H. Couch Company autophone systems.

E. A. Finkenheimer, special water wheel expert of the Platt Iron Works, Dayton, Ohio, has returned to Seattle, from a trip to San Francisco.

J. H. Jamison, manager Spokane office Westinghouse Electric & Manufacturing Company is recovering from a severe attack of pneumonia.

G. A. Richardson, superintendent of railway, Puget Sound Traction, Light & Power Company, has returned to Seattle from a business trip to Chicago.

C. A. Whipple has been appointed as general superintendent of the light and water department at the Eugene, Ore., municipal plant, succeeding A Myers.

A. A. Miller, manager railway and lighting division, Seattle office Westinghouse Electric & Manufacturing Company, is making a business trip to Spokane and Butte.

F. E. Wilkinson has severed his connection with the Oro Electric Corporation and has joined the Minerals Separation American Syndicate, Ltd., as assistant to the chief engineer.

A. E. Rowe, sales manager of the Telephone Electric Equipment Company, San Francisco, left the latter part of the week for a short trip through central and southern California.

A. E. Brough, manager of the Bear Lake Power Company of Montpelier, Idaho, is visiting in Salt Lake, Utah. Mr. Brough was formerly chief electrician in the shops of the Denver & Rio Grande Railroad Company there.

Raymond J. Andrus, vice-president and general manager of the Northwest Electric & Waterworks, Seattle, has taken temporary charge of the company's plant at Montesano, Washington.

J. C. Kirkpatrick, president of the National Pole and American Cross Arm Company, Escanaba, Michigan, and **Wm. Carpenter,** vice-president of the company, spent a few days in Seattle last week.

H. W. Crozier, engineer with Sanderson & Porter, is expected to return to San Francisco from the annual convention of the American Institute of Electrical Engineers on July 19th.

R. G. Littler, electrical contractor at Portland, Ore., is attending the convention of the National Electrical Contractors' Association at Chattanooga, Tenn., as the representative of the Oregon Electrical Contractors' Association.

Jos. G. Lazarus has resigned as sales manager of the California Electric Supply Company, to go into business with **Frank R. Lazarus,** his brother, as jobbers and dealers in insulating materials and electrical specialties at 171 Jessie street, San Francisco.

A. R. Loughborough of the Western Electric Company, San Francisco, has been appointed manager of that company's Salt Lake branch. **M. S. Orrick,** representative of the company in that city, will succeed Mr. Loughborough as sales manager of the company in San Francisco.

B. D. Horton, general manager of the Detroit Fuse & Manufacturing Company, and **W. T. Hessell,** New York manager for the company, are visiting the Pacific Coast. During the past week they were at San Francisco and Los Angeles and they will return by way of Vancouver.

H. M. Friendly was the delegate from the Portland Section of the A. I. E. E. to the National Convention, held at Cooperstown, N. Y., June 23 to June 27, 1913. Mr. Friendly and Mr. A. E. Burns presented a paper before the convention on the subject of "The Adaptation of Automatic Methods to Long Distance Telephone Toll Switching."

C. J. Rhodin and **G. H. Hewins,** in the engineering staff of the J. G. White Engineering Corporation, have left on a tour of inspection of the site of the new Wolverton dam and storage reservoir which the White company will construct for the Mt. Whitney Power & Electric Company on the Kaweah River in the mountains east of Visalia.

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, visited the Lake Spaulding and Bear River development of his company during the past week accompanied by Charles A. Sutro, James A. McCandless, John McCandless, Chas. H. Crocker, Frank A. Somers, Dr. E. L. Dow, P. E. Bowles and C. N. Black. The company has 3000 men working on the 14 construction camps, and since the commencement of the development work last fall the company had expended, to July, $4,500,000 in this work alone and before the present developments are completed another $4,500,000 will be paid out. With other improvements in contemplation the entire project will cost approximately $15,000,000. Up to July 1 the Lake Spaulding dam had been raised 65 ft. above bedrock and concrete is being poured in at a rate of 1500 cu. yds. per day. Steel for the Drum power house is up, concrete for roof and walls is being poured and foundations have been laid for two generators, now en route from the East. Two other power developments are in progress, one in Christian valley and the other in Auburn ravine, one mile below Auburn. Steel towers to carry a voltage of 100,000 have been completed to Cordelia, a distance of 109 miles.

OBITUARY.

J. Y. Coffman, owner of the Chehalis, Washington, telephone system, died at his office in that city on July 10. Mr. Coffman was 66 years old and had resided in Chehalis since the early '90s.

MEETING NOTICES.

Oregon Society of Engineers.

The Oregon Society of Engineers are making every effort possible to have a "technical man" placed on the civil service commission of Portland, Oregon. The engineers feel that it is only just and proper that a "technical man" should sit upon the commission and supervise examinations relating to engineering subjects.

Salt Lake Electric Show Association.

At a recent meeting of the Electric Show Association it was decided to postpone the Electric Show which had been contemplated for the first week in October of this year until next spring. Owing to the numerous attractions in Salt Lake City this summer and early fall it was thought that an electric show in April would be of greater interest to the public.

Salt Lake Jovians.

Statesman Leo Brandenburger plans to hold a Rejuvenation of the Sons of Jove Friday, October 3d in this city. Most of the electrical men of this territory avail themselves of the reduced rates to Salt Lake City for the Utah State Fair and Mormon Conference, and the local Jovians will take advantage of this fact to raise their potential a few degrees by initiating them into the Jovian order.

Seattle Jovian League.

There was a good attendance at the Seattle Jovian League lunch held at the Rathskeller on Friday, July 11. The chief thing in hand was unfinished business in relation to the special luncheon to be given on July 18th. Preliminary to the completion of this business short addresses were made by H. J. Gille, sales manager for the Puget Sound Traction, Light & Power Company, Norwood W. Brockett, secretary of the Northwest Electric Light & Power Association and others. Mr. Gille's talk had to do with the progress of Jovianism and that of Mr. Brockett with stirring up interest in the convention of the Northwest Electric Light & Power Association to be held on September 3, 4 and 5. Special mention was made of the fact that one evening of the time when the convention is in session will be turned over to the Jovians for rejuvenation purposes. Complete arrangements were made for the luncheon on the 18th, including arrangements for financing the affair. Ample provision has been made for entertaining a large crowd.

NEWS OF WASHINGTON PUBLIC SERVICE COMMISSION.

The commission has suspended for 90 days from July 16, the new air line long distance tariff proposed by the Pacific Telephone & Telegraph Company which was to have gone into effect on the date named. The commission will investigate the reasonableness of the rates under complaints already on file. The rates proposed would increase the charges across the State but it is claimed by the company that short-distance charges would be decreased in many cases. Under the proposed system the state is laid out in six-mile squares, the air line basis of computation being the distance between squares.

TRADE NOTES.

The Inland Empire Paper Company, Spokane, has ordered from the General Electric Company two 1200 h.p. synchronous motors.

Charles C. Moore & Company, Seattle, have received the contract to furnish two 10 h.p. boilers for the Weart building at Vancouver, B. C.

The General Electric Company, Seattle, has been awarded a contract by the Puget Sound Traction, Light & Power Company at Bellingham, for three 500 kw. water cooled 60,000 to 2300 volt transformers.

The Standard Underground Cable Company, Seattle, is furnishing the cables for the Cashmere, Washington Lighting plant and the cables are being manufactured at the Oakland, California, factory of the company.

Pierson, Roeding & Company, Seattle, have been awarded the contract for Orangeburg fibre conduit for the underground installation in connection with the cluster light system being installed at Boise, Idaho.

The first installation in the northwest of the General Electric park way ornamental luminous type of inverted arc lamps has been installed on General Electric ornamental lamp posts in Peninsula Park, Portland, Oregon.

The Pacific Electric Manufacturing Company, San Francisco, recently furnished the Great Western Power Company with four 100,000 volt tower switches for use in connection with the Antioch substation. The same type of switch was furnished the Mississippi River Power Company for use on the Keokuk Development.

The central station companies and supply dealers of Salt Lake, Utah, report a rather interesting result of the recent reduction in the price of Mazda lamps. Whereas formerly the greater call for lamps was in the 15 and 25 watt sizes for residence use, so that the sales of 25 watt lamps were twice as great as the 40's, the conditions now are practically reversed, with a considerable call for the new small bulb 60-watt lamps. It is apparent that as the prices of Mazda lamps are reduced the reduction in revenue from the sale of current will be less marked with the substitution of Mazda for carbon and Gem lamps.

The Fort Wayne Electric Works of the General Electric Company, Seattle, secured the following contract for equipment at the Tacoma substation: Six 1500 k.v.a. 50,000 volt primary, 2300 volt secondary 60 cycle oil insulated water cooled, shell type transformers; 41 disconnecting switches; 7 oil switches; 2 aluminum cell lightning arresters and 4 potential transformers, 50,000 volt primary, 100 volt secondary. The transformers are to be duplicates of 6 transformers already installed in the substation and will complete the installation. The total transformer installation sold by the Fort Wayne Electric Works to the city now comprises twelve 1667 k.v.a. transformers at Nisqually and twelve 1500 k.v.a. transformers at the Tacoma substation. The contract was awarded at approximately $25,500.

ELECTRIC LIGHT AND POWER ASSOCIATION CONVENTION.

Norwood W. Brockett, secretary of the Northwest Electric Light & Power Association announces that the date for this year's convention has been set for September 3, 4 and 5, at Seattle. All of the companies have promised large representation and delegates from Washington, Oregon, Idaho and Montana will be in attendance. Full announcement of the convention's program will shortly be published.

COPPER CLAD WIRE LITIGATION DISMISSED.

Important litigation in regard to Copper Clad Wire which has been pending in the United States Court in Pittsburgh for the past two years between Duplex Metals Company complainant and the Standard Underground Cable Company defendant, was virtually decided June 25th when the case came before the court on motion made by complainant to dismiss the bill in respect to patent infringement. The bill as originally filed charged infringement of the patent and infringement of a trade mark. The motion made by complainant was to dismiss without prejudice; that is to say a dismissal leaving the complainant in a position to renew the suit at its pleasure. The motion was opposed, defendant contesting that the bill should be dismissed in this regard and a dismissal should be on the merits of the question.

The order of the court directs that the complainant pay the costs. The only portion of the suit not thus disposed of is in regard to the right to use the trade name "Copper Clad" and which is expected to go to a hearing in the early fall.

THE ELECTRICAL CONTRACTORS' DEPARTMENT

NEWS OF ELECTRICAL CANTRACTORS.

The Morrison Electric Company have completed their electrical contract in the new Waverly Golf Club.

The M. J. Walsh Company, of Portland, have just completed the second half of the electrical installation in the Standard Oil Company's plant near Linton, Oregon.

NePage, McKenny & Company, Seattle, have the contract for installing the electrical fixtures in the building of the Phoenix Brewery Company, Victoria, B. C., at $1000.

The Western Electric Works of Portland, Oregon, are rewiring the Corbett Estate Building on the southwest corner of Fifth and Stark streets, which was recently damaged by fire.

The W. L. Bradley & Company obtained the electrical contract for the concrete apartment house of M. J. Buell, located on the northwest corner of Thirteenth and Main streets, Portland, Oregon.

The West Coast Engineering Company of Portland was the low bidder for decorative post lighting on the Twelfth street bridge, and the Pacific Fire Extinguisher Company was the low bidder on the Union avenue bridge.

Davis & Hull, electrical engineers and contractors, Tacoma, have been awarded the contract for wiring the 10-room residence of S. C. Knowles on North Fourth and J streets, same to be wired with conduit and provisions made for electric heating and cooking.

At noon July 11th, the electrical workers on the Northwest Bank Building in Portland went out on a strike. The cause of the strike was the fact that the Pacific Fire Extinguisher Company had "signed up" with the McNulty faction of the Electrical Workers Union in San Francisco, while the electrical workers belong to a faction known as the Reid faction in Portland.

W. H. Smith Electric Company, Portland, has obtained the electrical contract for installing a complete system of lineolight show case and show window fixtures in the new $50,000 jewelry store of Feldenheimer's, located on the southwest corner of Park and Washington streets. This company also has the electrical contract for the new warehouse of the Pacific Bridge Company.

Gray & Barash, electrical engineers and contractors, Seattle, are putting in a complete water system for the Golf and Country Club at the highlands, consisting of a direct connected motor-driven pump operating against a 350 foot head with a capacity of 500,000 gallons every 24 hours. They have just finished installing 15 General Electric individual motors, ranging from 2 to 40 h.p. in the packing plant of Barton & Company. The supplies for each of these jobs were furnished by the Pacific States Electric Company.

NEW ELECTRICAL ORDINANCE FOR SAN FRANCISCO.

(Continued.)

Sec. G. All buildings or other structures wherein electrical wires are to be installed without the additional protection of a metallic armor the same may be installed by means of porcelain bushings where such wires pass at right angles to timbers, and where such wires are parallel with timbers they shall be supported on porcelain knobs; provided, however, that in no case shall a wire be nearer than one inch of the timbers. Where porcelain knobs and bushings are used the wire shall in all cases be treated as bare electrical wire and in no case shall the insulation of the wire proper be depended upon for perfect insulation. Where the use of non-metallic conduit is advisable nothing in this ordinance shall be construed to prevent its use in connection with a knob and bushing installation.

Sec. H. In all cases where conductors for the carriage of electricity are to be installed, enclosed in metallic armor, the same shall be installed in rigid iron conduits the minimum wall thickness of which shall be .100 inches, and the minimum internal diameter .62 inches; or where said conduits are to be installed on interior surfaces they may be enclosed in metal moulding constructed of iron or steel with backing at least .050 inch in thickness, and with capping not less than .141 inch in thickness, and so constructed that when in place the raceway will be entirely closed, thoroughly galvanized or coated with an approved rust preventative both inside and out to prevent oxidation, or, said conductors may be installed in other armor material, weight and form of armor must be such as to afford under conditions likely to be met in practice, protection, substantially equivalent in all respects to that afforded by unlined rigid conduit. In all cases the entire metallic system shall be effectively and permanently grounded. No conduit or other armor shall terminate other than in an accessible metallic fitting and be continuous from fitting to fitting.

Sec. I. No group or receptacles exceeding twelve in number or consuming more than six hundred and sixty watts shall be dependent on one cutout, except decorative lighting system, footlights, borders and procenium sidelights in theatres, which shall not exceed twenty-four receptacles nor consume more than thirteen hundred and twenty watts.

Sec. J. Each and every electrical installation shall have a main service switch independently controlling each and every service connection that may be installed. All main service switches shall be installed at the point of entrance of any underground service and in the case of overhead service the main service switch shall be located at the termination of the overhead service wires in buildings not over seven (7) feet from the floor and in an open and unobstructed place, and shall be operated from a point within the main entrance of all buildings or other structures not more than five (5) feet from entrance door. The swtich operating the main service switch shall be enclosed in a metal frame and box with a clear glass face not less than one-quarter inch thick, provided, however, the current used for the operation of all elevator motors shall not be disconnected by the operation of main service switches. All meters in each and every electrical installation shall be installed at the same location as the main service switches.

Sec. K. In any building or other structure where more than six electric meters are to be installed, a special room shall be set aside for their reception. The height of said room shall be not less than seven (7) feet high, the width not less than five (5) feet wide, and a wall area permitting 18 x 18 in. for each meter required, and 18 x 18 in. for each main service switch.

The above rooms shall be fireproofed with metal lath and plaster, or metal, and a sufficient wood facing to support meters and other apparatus required and be readily accessible.

Sec. L. All wires hereafter installed in or on all buildings or other structures in the city and county of San Francisco, except in dwellings and flats as the same are now or may hereafter be defined in the building law of the city and county of San Francisco, and used for the purpose of conducting electricity shall be enclosed in iron conduits or other armor, as hereinabove set forth.

(To be continued.)

FINANCIAL NOTES.

The Pacific Gas & Electric Company report gross earnings for the five months ending May 31, 1913, were $6,796,000. Net earnings, after payment of taxes, were $2,989,500. The surplus, after charges, was $1,408,600. The balance, after payment of dividends on preferred stock, was $1,158,600.

For the month of May the gross was $1,310,676, the net was $553,495 and the surplus was $234,000. The company intends to issue $4,500,000 one year 6 per cent notes, the proceeds of which are expected to care for its financial requirements until market conditions have improved, and $5,000,000 debentures and $5,000,000 first and refunding bonds, recently authorized by the California Railroad Commission, can be sold on a more favorable basis than at present.

The Central California Gas Company has issued its regular semi-annual statement for the fiscal year ending June 30. For the year the gross earnings increased 17 per cent, while the net earnings were 90 per cent better. Earnings of the new pipe line passing through Exeter and Lindsay are reflected in this statement. Connections are being made rapidly in both of these cities. The statement rendered by the company is as follows:

Six months ending June 30—		
Gross revenue	$44,568.16	$51,888.23
Operating cost, including maintenance, insurance and taxes	31,519.36	27,934.50
Net earnings	$13,048.80	$23,953.73

A gain of approximately 90 per cent in net earnings.

June earnings of the Northern California Power Company, consolidated, of San Francisco, show a considerable increase over the earnings for the same month last year. The estimated operating surplus is about double that of 1912. This company supplies Shasta, Tehama, Glenn, Butte and Colusa counties with electric light and power, and supplies water and gas in Redding and Willows.

Figures given out by the company follow:

Gross earnings—June, 1912, $62,288.80; June, 1913, $70,263.36; increase, $7,974.56; percentage of increase over corresponding month last year, 12.8.

Estimated operating surplus—June, 1912, $9,549.18; June, 1913, $18,928.32; increase, $9,379.14; percentage of increase over corresponding month last year, 98.2.

Authority has been granted by the California Railroad Commission to the San Joaquin Light & Power Corporation to issue $1,776,000 of bonds. The company was also given authority to pledge these bonds for an issue of two-year six per cent collateral trust notes. It was provided that notes may be issued up to 75 per cent of bonds pledged.

The board of directors of the Oakland, Antioch & Eastern Railway have placed in circulation among their stockholders a subscription list to the recently authorized $1,000,000 bond issue at $85 and interest. If they succeed in raising by this method the money required to pay for needed equipment the proposed assessment on capital stock will not be levied. But if the bond subscriptions be not sufficient two assessments will be levied. One of these of $10 per share will be against the 35,000 shares of capital stock of the Oakland & Antioch Railway and the other of $5 per share against the 100,000 shares of capital stock of the Oakland, Antioch & Eastern Railway.

The Los Angeles Gas & Electric Company, Santa Barbara Gas & Electric Company and Long Beach Consolidated Gas Company have reported earnings, the former reports for five months and the two latter for four months as follows:

Los Angeles Gas & Electric Company: Five Months.	1913	1912.
Gross	$2,195,025	$1,874,703
Operating	1,183,741	1,012,744
Net	$1,011,384	$ 861,959
Interest	166,791	162,013
Surplus	$ 844,593	$ 699,946

For the first five months in 1913 gross increased $320,322 (17 per cent) and net earnings increased $150,000 (17 per cent) over the earnings for a similar period in 1912. Net earnings are equal to six times bond interest, the increase in net earnings alone almost equaling interest charges.

Santa Barbara Gas & Electric Company: Four months.	1913.	1912.
Gross	$90,426	$85,669
Operating	47,676	54,132
Net	$42,750	$31,537
Interest	13,480	12,971
Surplus	$29,270	$18,566

For the first four months in 1913 gross increased $4757 (4 per cent); operating decreased $6456 (12 per cent), and net earnings increased $11,300 (35 per cent) over the earnings for a similar period in 1912. Net earnings are equal to a little over three times interest charges, the increase in net alone being 84 per cent of total interest charges.

Long Beach Consolidated Gas Co.: Four months.	1913	1912.
Gross	$73,204	$55,289
Operating	48,016	36,231
Net	$25,188	$19,058
Interest	9,011	8,783
Surplus	$16,177	$10,275

The first four months in 1913 gross increased $18,000 (32 per cent) and net earnings increased $6130 (32 per cent) over the earnings for a similar period in 1912. Net earnings are equal to 2.7 times bond interest for this period.

The Economic Gas Company of Los Angeles has been criticised by the California Railroad Commission in a decision rendered by the commission, in which the corporation was given the right to issue $270,000 in bonds, and denied the authority to issue $365,000 in bonds. The commission declares that $295,000 of a recent issue of $930,000 in bonds were issued prior to the effective date of the public utilities act, and that $635,000 of the bonds were issued illegally thereafter, but finds that the company may properly issue $270,000 of bonds to replace an equal amount of the void bonds, the proceeds to be used to refund indebtedness. The company is also required to notify the holders of the void bonds that they are illegal and were issued without proper authority. In its find the rate board declares L. P. Lowe, head of the gas company, formed a company called the California Light & Fuel Company and thereafter issued a large number of bonds to Lowe and to the Light & Fuel Company. This is what the commission declares was a "financial flimflam."

The California Railroad Cammission has rendered a decision granting authority to the Central California Gas Company to use bonds heretofore authorized in the sum of $7,000,000 and its preferred stock heretofore authorized in the sum of $5300, for certain improvements to its gas plant in the city of Visalia. The decision states that C. S. S. Forney, president of the Central California Gas Company, has organized the General Operating & Construction Company, and that in his capacity as president of the gas company has allowed himself to profit in his capacity as president of the construction company. The commission finds that certain work to be done for the Central California Gas Company was estimated to cost $105,000 and the allowance was made for such an expense by the gas company. Thereafter Mr. Forney let the contract of the gas company to the General Operating & Construction Company of which he is president. This construction company did the work for $85,000. The commission finds that there was a profit for the construction company of approximately $15,000 on this work. As a condition of its order granting the application, the commission requires that the profit accruing to the construction company be waived. The commission requires also that no further moneys shall be paid by the gas company to the construction company without the commission's order.

NEWS NOTES

INCORPORATIONS.

BOISE, IDAHO—Articles of incorporation for the Butte, Boise & Winnemucca Railroad Company have been filed with W. L. Gifford, secretary of state, with a capital stock of $40,000,000. Chester N. Halverton of Boise is secretary.

OREGON CITY, ORE.—A new railroad from Oregon City to Portland has been incorporated. It is known as the Portland & Oregon City Railway Company and is incorporated for $200,000 by T. O. Fletcher, B. E. Fletcher and Frances Vandermeer. Electricity or gasoline motive power will be used.

SALT LAKE, UTAH.—The Hoppie Electrical Company has been incorporated with a capital stock of $500,000. The company will manufacture audiographs and telephone repeaters. Curtis B. Hawley, president and general manager of the Intermountain Electric Company of this city, is president of the company, L. S. May is vice-president and Murray C. Godbe secretary-treasurer.

ILLUMINATION.

ALBANY, ORE.—The city council has granted a franchise for a gas plant to G. L. Rauch, Portland.

SUTTER CREEK, CAL.—Sealed bids will be received until July 21 for an electric lighting system in this city.

MEDFORD, ORE.—The establishing of a gas plant for this city is being considered. W. J. Hillis and Dr. E. H. French are behind the proposition.

SACRAMENTO, CAL.—The Oro Electric Company has been granted a franchise to bring its power lines into the county over and on the county roads.

LOS ANGELES, CAL.—Sealed bids will be received up to July 28th for furnishing the necessary equipment and lighting with electric lights certain streets in the Westgate lighting district.

BARSTOW, CAL.—The Southern Sierras Power Company has taken over the electrical department of the Barstow Utility Company and further developments of light and power may be looked for.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company has made application for three lighting franchises, one for territory in North Seattle and the others in Kirkland and Redmond.

LOS ANGELES, CAL.—The Board of Supervisors has adopted plans and specifications for the installation of a lighting system in Van Nuys lighting district. Bids for same will be received up to July 28th.

CENTRALIA, WASH.—The Washington-Oregon Corporation which furnishes power to practically all of the smaller towns of southwest Washington, has purchased the electric light plant at Woodland and will remodel it.

CENTRAL POINT, ORE.—Representatives of the California-Oregon Power Company have discussed the proposition with the council for another line for electric current to the city pumping plant, and the matter will be taken up at once.

SAN DIEGO, CAL.—Plans and specifications for a more economic system of ornamental street lights, recently completed in the office of the city engineer, are ready to be reported to the council. The classes of lights to be submitted are class A, B and C. All of these types are to combine illuminated street signs.

GALLUP, N. M.—An election will be held on a day to be fixed later for the purpose of submitting to qualified voters the question of granting a franchise applied for by the People's Light & Power Company for the right to erect and maintain an electric power and light plant within the corporate limits of the town.

SALT LAKE, UTAH.—Information has been received at the local land office that approximately 1445 acres of land located on Huntington Creek in Emery and Carbon counties have been withdrawn from entry, settlement and location and reserved for water power sites. The action is in accordance with an executive order of May 27, 1913.

TWIN FALLS, IDAHO.—The Beaver River Power Company has accepted the power franchise granted it by this city about sixty days ago and proposes to start work within a short time. This company, which is controlled by the Nunns, has a plant on the Malad River. It has entered the territory in the vicinity of Twin Falls in competition with the Great Shoshone and Twin Falls Water Power Company, and is making sweeping reductions in rates wherever active competition exists. The franchise provides for a maximum lighting rate of 12c per kw.-hr., and it is promised that the lighting rate when service is inaugurated, will not exceed 9c. The company has also obtained franchises in Hagerman, Buhl and Filer.

BAKERSFIELD, CAL.—Manager A. E. Wishon of the San Joaquin Light & Power Company says: "Gas consumers of Bakersfield cannot expect a reduction for the present at least. The present maximum rate of $1 a thousand cu. ft., is a means of compromise in connection with the pending litigation between the Bakersfield Gas & Electric Company, a subsidiary of the San Joaquin Light & Power Company, and the city of Bakersfield, growing out of the passage by the city trustees of an ordinance fixing the price of gas to 50c a thousand. The ultimate results will justify, if the rate of increase continues, a lower rate to the smaller consumer. But at present the net income on operations of the local plant, as indicated by my statement to the city trustees, will not justify a reduction in rate." In connection with the enlargement of the hydraulic electric generating plant in Kern River Canyon, which work is now getting under way, Mr. Wishon stated that the rebuilding of the power line from there to the local steam auxiliary station would be started in the near future. The voltage of the line will be increased from 10,000 to 60,000, the plan being to ultimately tear down the present carrier. The distance between the two plants is 14 miles, and the work of rebuilding the line will be carried out at an expense of approximately $2500 a mile.

TRANSMISSION.

VANCOUVER, B. C.—The Bridge River Co., Inc., is planning a development in the Lillooet district by which 200,000 horsepower will be developed, at an approximate cost of $8,000,000. The development includes a large dam on the Bridge River and a three-quarter mile tunnel.

LOS ANGELES, Cal.—Another $150,000 will become available for aqueduct power development in the near future as a result of action by the board of public works, who adopted resolutions increasing the amount to be paid back to the

power bureau by the aqueduct bureau for money advanced to complete joint tunnel work, from $600,000 to $750,000.

BOISE, IDAHO.—Attorneys for the State Bank of Chicago have filed a petition in the Federal Court here to foreclose a mortgage of $3,319,000 against the Idaho-Oregon Light & Power Company, because of a default in the payment of $95,345 in interest on the bonds due and payable April 1st. It is announced by officers of the company that this is the first move in a reorganization and consolidation of the Idaho-Oregon Light & Power Company with the Idaho Traction Company, operating all the interurban lines in this immediate vicinity.

TULARE, CAL.—Members of the new board of trade have made calls on stockholders of the Tulare Power Company to secure their consent to the pooling of stock in the reorganization scheme now being carried on. Attorney Drew states that over 2000 shares have been placed in the pool up to this time. The new plan of financing the company is through five trustees, two of whom are to be chosen by the Assets Realization Company of Chicago, two by the power company and the fifth to be chosen by those four or by the railroad commission in case of disagreement.

TRANSPORTATION.

FRESNO, CAL.—The Fresno Traction Company has been granted a franchise for a street car system from the city limits to San Joaquin River near the Riverside Country Club.

PORTLAND, ORE.—Formal application has been by the Portland Railway, Light & Power Company for a franchise for the first of the proposed cross-town street car lines on the East Side.

FRESNO, CAL.—News reached this city recently to the effect that the Big Four Electric Railway which now has a portion of its line completed from Tulare to Woodlake, will apply to the State Railroad Commission for permission to increase its capital stock to $5,000,000 with the intention of extending its lines north into Dinuba, Hanford and Fresno. The road is now graded as far as Woodlake, a distance of a little over 21 miles from Tulare, and work is started on the branch toward Porterville. The roadbed is ready for the laying of rails and this will be done as soon as the steel arrives, which has already been ordered. During the past week officials of the company incorporated the town site of Woodlake with a capital of $15,000. Deeds were filed at Visalia to property on which will be erected passenger and freight depots and general office buildings for the Big Four Electric Railway at Tulare. The buildings which will be erected without delay, upon the property will cost in the neighborhood of $75,000. The site will afford connection with both the S. P. and Santa Fe.

TELEPHONE AND TELEGRAPH.

YUMA, ARIZ.—The crew of the Mountain States Telephone & Telegraph Company which has been operating in Yuma for some time, has completed its labors and left for Deming, N. M., to install similar service for the company.

VANCOUVER, WASH.—O. J. Olsen of Yacolt, and Ed. Murphy were in the city interesting Vancouver men in a project to get a direct phone line from Vancouver to Yacolt. It is planned to construct the line by way of the Lewis River and thus have a straight line between the two places.

HOOD RIVER, ORE.—The Oregon-Washington Telephone Company has been organized as a consolidation of the Home Telephone Company of Hood River, Ore., the White Salmon Valley Telephone Company and the Goldendale Telegraph and Telephone Company.

WATERWORKS.

HAYWARD, CAL.—The San Lorenzo Water Company has been notified to go ahead with laying of improved water pipes.

PROENIX, ARIZ.—At an election held in Phoenix recently for the purpose of voting on whether the Water Users' Association should take over the distributing system of the Salt River project to operate and maintain at their own expense, the proposition passed by a vote of 3 to 1. The vote is regarded as only advisory.

SILVER LAKE, ORE.—At a meeting of the city council it was decided to install a complete fire and water system. City bonds to the amount of $2500 to run five years and bear 6 per cent interest will be issued.

GOLDENDALE, WASH.—The bid of the Consolidated Contract Company of Portland for work on the water system for $21,000 was accepted. This is for building the reservoir and the first four miles of pipe line.

LOS ANGELES, CAL.—A contract for the installation of a water system at National Boulevard Heights, has been let to Robert Marsh & Company. Approximately 25,000 ft. of pipe will be laid. The Erwin Heights Water Company will supply the water.

PORTLAND, ORE.—The Commercial Club of Oregon City has made formal application in behalf of that city for the extension of a pipe line to supply them with Bull Run water. Commissioner Daly will investigate the possibilities of such an extension.

VOLLMER, IDAHO.—Bids for the construction of a water works system at this place have been called. The specifications call for the construction of a pumping plant, tank and pipe lines. The system is to be completed this summer and will cost about $10,000.

PENDLETON, ORE.—At a special meeting of the council the bid of the American National Bank of this city for one-half of the $200,000 water bonds was accepted, and the bank was given a 30-day option on the other half. The bid was for 96½ cents on the dollar, and the amount becomes available at once. Now that half of the bonds are sold the city will proceed with the gravity water system.

RIVERSIDE, CAL.—The city council has voted to purchase the Garner Tract of water bearing land in San Bernardino basin. The Riverside Water Company had an option on the tract to develop water, and when it sold its water plant to the city it turned over the option also. The price is $12,300 for 30 acres. The tract will be used to develop surplus water needed for the city's domestic supply.

GLENDALE, ARIZ.—An election has been called for August 7th for the purpose of submitting to the qualified voters the question of incurring a bonded indebtedness in the sum of $35,000, for enlarging and improving the water works and purchasing same. Said bonds will be of the denomination of $500 each and bear interest at the rate of 6 per cent per annum, payable semi-annually.

HOLTVILLE, CAL.—At a recent meeting of the directors of No. 2 Water Company it was decided to proceed at once with construction of an additional five miles of ditches and laterals, and work has already begun. Work on the east canal, of which there remains two miles to be completed, will be started the first of October. A loan of $25,000 has been made to carry out plans.

SAN DIEGO, CAL.—That it will probably be necessary to call a bond election in the near future for the development of a water impounding and distributing system of the city was the decision of Mayor O'Neall and members of the council in conference. Superintendent Fay and Hydraulic Engineer Whitney will shortly submit plans for improvements. The first improvement planned is a dual line from Lower Otay reservoir to the city.

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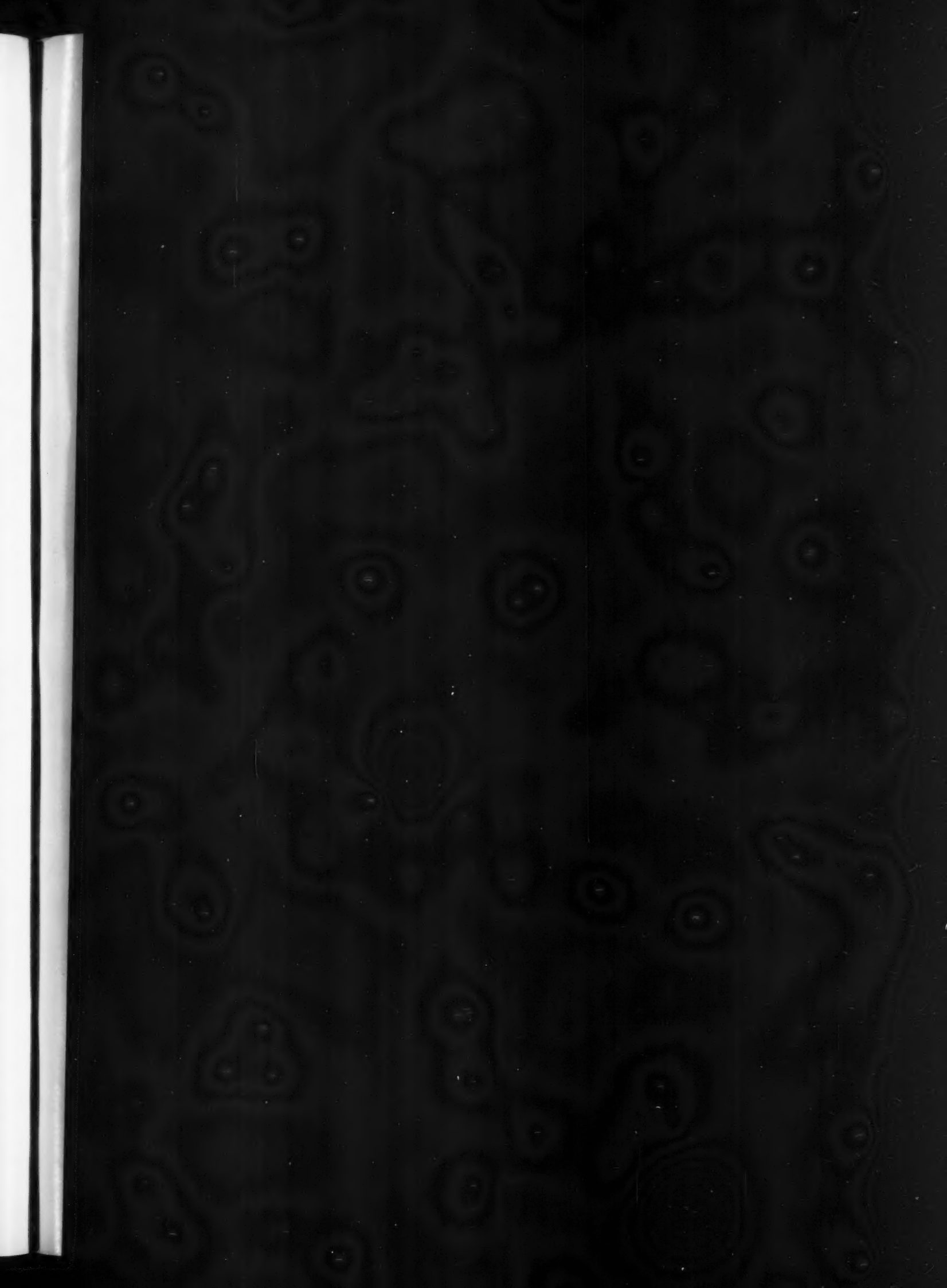
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